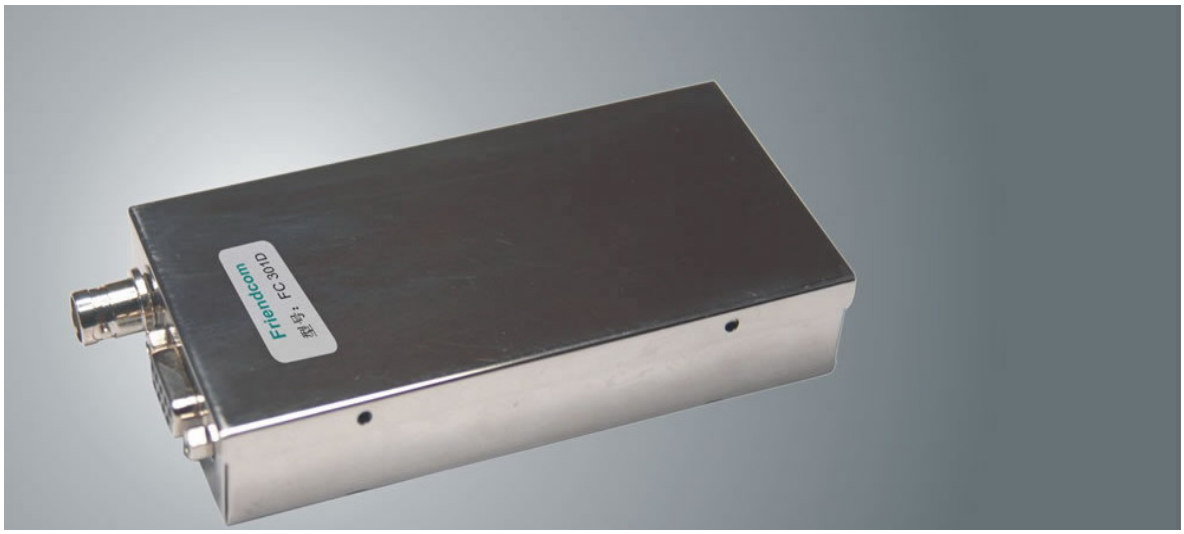
FC-301D
USER MANUAL



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SPECIFICATION

GENERAL

Equipment Type……Data Radio

Performance Specification…….....TIA/EIA-603 & ETS 300-113

Band ……..UHF/VHF

Channel Spacings……25KHz,12.5KHz programmable

RF Output Power……1W / 5W Programmable

Modulation type ……16K0F3E,8K5F3E

Intermediate Frequency…… 45.1MHz & 455KHz

Number of Channels……16

Frequency Source ……Synthesizer

Operation Rating……Intermittent

5:5:90 (TX: RX: Standby)

Power Supply ……12.5V DC Nominal Voltage

Temperature Range

Storage……from –40°C to +80°C

Operating……from –30°C to +60°C

Current Consumption

Standby (Muted) ……≤40mA

Transmit 5 Watts RF Power ……< 1.5A

Transmit 1 Watt RF Power……<0.8A

Frequency Bands : ……RX UHF: U1 400 – 470 MHz

……TX UHF: U1 400 – 470 MHz

Dimensions……(120mm)L x (60mm)W x (20mm)H

Weight……≤150 grams

TRANSMITTER

Sustained Transmission…… Nominal conditions

Time:	5	10	30 sec
Power:	>95%	>95%	>90%

Frequency Error……±2.5 ppm

Frequency Deviation:

25kHz Channel Spacing……≤±5.0kHz,

12.5kHz Channel Spacing……≤±2.5kHz,

Audio Frequency Response…… Within +1/-3dB of 6dB octave

@300Hz to 2.55kHz for 12.5kHz C.S
@300Hz to 3.0khz for 25kHz C.S

Adjacent Channel Power

25kHz……< 70 dBc @ Nominal Condition

<65 dBc @ Extreme Condition

12.5kHz ……< 60 dBc @ Nominal Condition

< 55 dBc @ Extreme Condition

Conducted Spurious Emission ……< -36 dBM

Modulation Sensitivity…… 100mV RMS@60% peak Dev.

Hum & Noise:

25kHz Channel Spacing……>40 dB (with no PSOPH)

12.5kHz Channel Spacing……>36 dB (with POSPH)

Modulation Symmetry ……<10% Peak Dev@1kHz input for nominal dev +20dB

Load Stability……No osc at >= 10:1 VSWR all phase angles and suitable antenna
No destroy at >= 20:1 all phase angle

RECEIVER

Sensitivity(12dB Sinad) ……UHF <-117 dBm,
VHF<-118dBm@Nom.Condition

Amplitude Characteristic……<±3dB

Adjacent Channel Selectivity:

25 kHz Channel Spacing ……≥70dB @ Nom.,

12.5kHz Channel Spacing……≥60dB@Nom.,

Spurious Response Rejection……70dB

Image Response…… > 70 dB

IF Response …… >70 dB

Others……> 70 dB

Intermodulation Response Rejection……≥65 dB

Conducted Spurious Emission @ Nominal Conditions……<−57 dBm

AF Distortion .....<5% @ Nom.,
<10%@ Extreme Condition

RX Hum & Noise:

25.0kHz CP.....< 40dB No PSOPH

12.5kHz CP .....< 40dB with PSOPH

Receiver Response Time .....< 20ms

Squelch Opening sensitivity: .....−118dBm

Squelch Closing sensitivity ..... −121dBm

Squelch Attack Time:

RF Level at Threshold ..... <40ms

RF Level at Threshold +20dB.....<30ms

L.O. Frequency Temperature Stability.....1 st <2.5 ppm,

2 nd <10 ppm for –30°C to +60°C

L.O. Frequency Aging Rate.....±2 ppm/year

REFERENCE CRYSTAL

Frequency..... 13MHz

Temperature Characteristic.....+/- 2.5PPM

from –30°C to +60°C

Aging Rate.....< 2ppm/year in 1 st year

<1ppm/year thereafter

TX to RX ..... < 20

RX to TX ..... < 25

ENVIRONMENTAL (performance without degradation unless stated)

Temperature..... deg C

Operating.....−30° to +60°C Degradation

Specified@Extreme

Storage ..... −40°C to +80°C

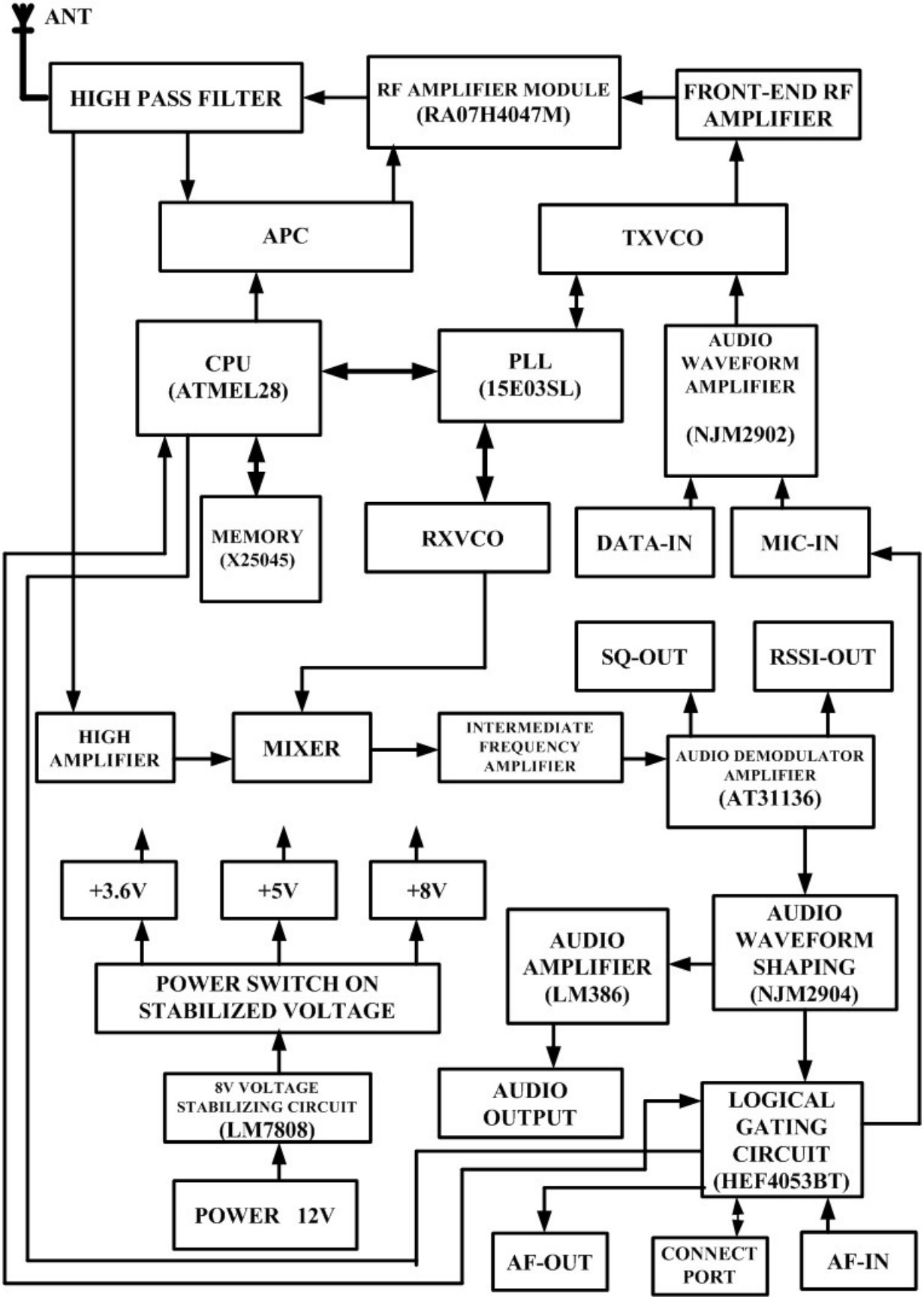
Recharging ..... −10 to +55

ESD..... 20kV (C-MIC >= 15kV)

Vibration..... MIL STD 810 C Procedures I,II,V and IEC68 26

• *Due to contintuning researching and development the company reserves the right to alter these specifications without prior notice.*

FC-301D CIRCUIT DIAGRAM



INTORDUCTION

The FC-301D Series of RF Link Modules from Friendcom utilizes the latest technology in its design and manufacturing. Both the UHF and VHF models are PLL (Phase Lock Loop Synthesizer) / microprocessor controlled, and offer one to five watts of power with 16 channel capability. Multiple functions including 1200 to 9600 baud rates,AC audio coupling,GMSK and FSK modulation are standard in these fully programmable wide bandwidth RF Link Module units.

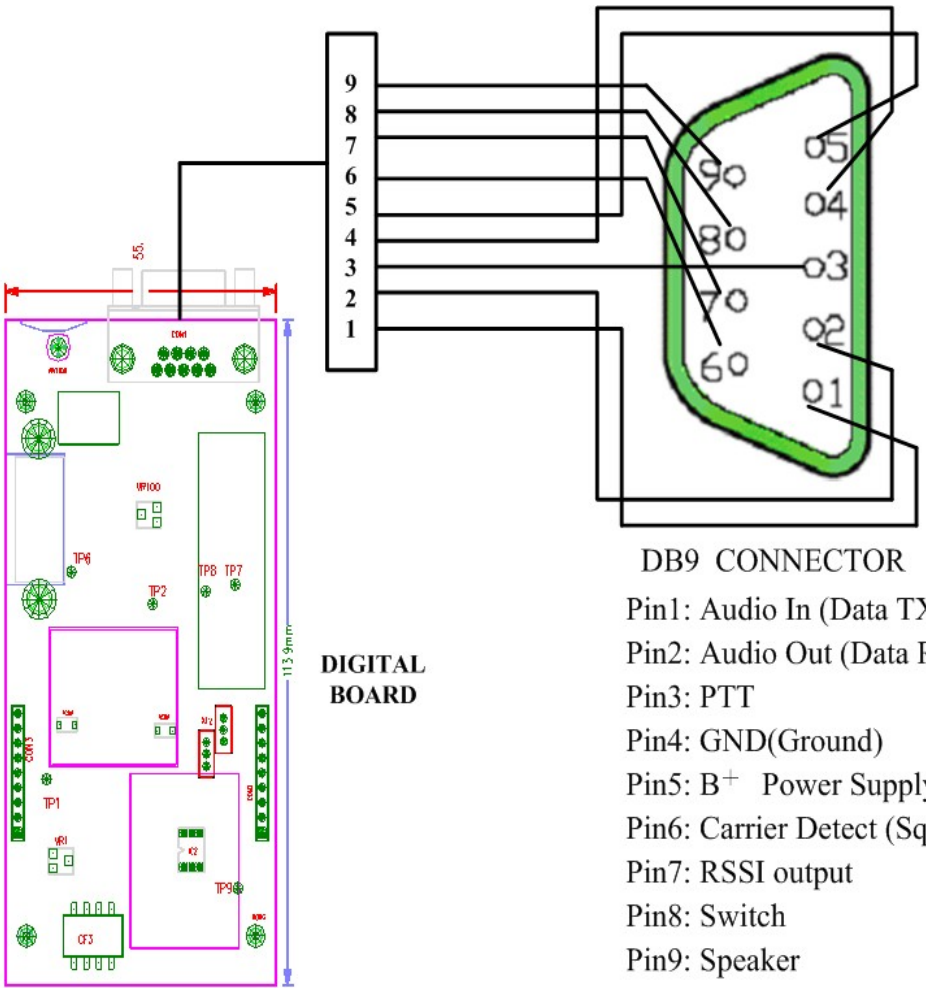
FEATURES

- **16 Channels**
- **1 / 5 Watt Programmable Output**
- **12.5 / 25 kHz Programmable Channel Spacing**

TROUBLESHOOTING GUIDE

SYMPTOM S	CAUSES	COUNTERMEASURES
Unit does not work	1.No power incomplete connection 2. No input voltage of 5V or 8V 3. CPU does not work 4. EEPROM fail 5. Channel error 6. PLL error	1.Check COM1 connection 2. Check IC500、IC504 3. Check IC510 4. Check IC502 5. Check CF3 6. Check TCXO、VCO、PLL IC
Bad RX Sensitivity	1.Antenna signal short-circuit 2.Antenna signal open-circuit 3. Bad electronic turner 4. Defective high frequency amplifier 5. Bad mixer 6. Local signal amplitude become small 7. Bad 1st and 2nd intermediate frequency	1. Check D106 D107 2. Antenna loose weld 3. Check L23 L24 L25 L26 4. Replace Q15 5. Check IC3 T3 T4 6. Check D103 Q111 7. Check XF1 XF2 IC2
Defective RX	1. No output signal 2. Bad signal waveform 3. Bad stability of VCO	1. Replace IC801 2. Check U2 c412 c404 3. Check component of VCO
PLL Error	1. TCXO frenquency error 2. Bad stability of VCO 3. PLL can't be locked	1.Check crystal oscillator of TCXO 2.Check the component of TX/RXVCO 3. IC301 Q321 Q320 C327
Low TX Power	1. Bad amplfier circuit 2. Bad APC circuit	1. Replace IC102 2. Check D102 IC1
No TX Power	1. No power on TX 2. No signal on driver 3. Bad amplfier circuit 4. Bad APC circuit	1. Check Q502 Q503 2. Check Q1 Q2 D101 3. Check IC102 D102 4. Check IC1
No Modulation	1. No input signal 2. No TX signal	1. Check IC801 2. Check U1 R403 R404

WIRING DIAGRAM



FACTORY SETTING DIAGRAM

Channel	RX Frequency	RX Turning Value (TV)	TX Frequency	TX Turning Value (APC)
1	400.1250MHZ	170	400.1250MHZ	65
2	405.1250MHZ	165	405.1250MHZ	65
3	410.1250MHZ	160	410.1250MHZ	65
4	415.1250MHZ	155	415.1250MHZ	65
5	420.1250MHZ	150	420.1250MHZ	65
6	425.1250MHZ	145	425.1250MHZ	65
7	430.1250MHZ	140	430.1250MHZ	65
8	435.1250MHZ	135	435.1250MHZ	65
9	436.1250MHZ	130	436.1250MHZ	65
10	440.1250MHZ	130	440.1250MHZ	65
11	445.1250MHZ	125	445.1250MHZ	65
12	450.125MHZ	120	450.1250MHZ	65
13	455.1250MHZ	115	455.1250MHZ	65
14	460.1250MHZ	110	460.1250MHZ	65
15	465.1250MHZ	105	465.1250MHZ	65
16	469.9750MHZ	100	469.9750MHZ	65

From above diagram ,TX Turning Value is base on 5W normal output power,please refer to The Manual of FC-301/D Program Software if you need other Turning value base on other output power.

(Note : Please contact us if you need detail service manual .)